APRIL/MAY 2025

CEL31 — PHYSICS OF MATERIALS

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What are different types of bonding in solids?
2. Define Miller indices.
3. State Bragg's law.
4. Define crystal.
5. What is meant by relaxation time?
6. State Ohm's law.
7. What are semiconductors?
8. Give the details of doping.
9. What is meant by depletion region?
10. Define mobility of charge carriers.

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SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Differentiate unit cell and primitive cell.

Or

(b) Briefly explain crystal systems.

12. (a) Derive Bragg's equation in crystal plane.

Or

(b) List out the applications of Bragg's spectrometer.

13. (a) Derive the expression for fermi energy.

Or

(b) Briefly explain mean free path of electrons.

14. (a) Classify the solids based on band theory.

Or

(b) Distinguish p-type and n-type semiconductors.

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15. (a) Derive the expression for potential barrier.

Or

(b) List out the applications of Hall effect.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Elucidate Bravais lattices in the crystal structure.

17. Explain the experimental technique of X-rays diffraction study using rotating crystal method.

18. Express Drude-Lorentz free electron theory of metals.

19. Write a detailed note on intrinsic and extrinsic semiconductors.

20. Illustrate the experimental method for the determination of Hall voltage on the basis of the theory of Hall effect.

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